QUICK START

5 YEAR WARRANTY

For complete product manual:
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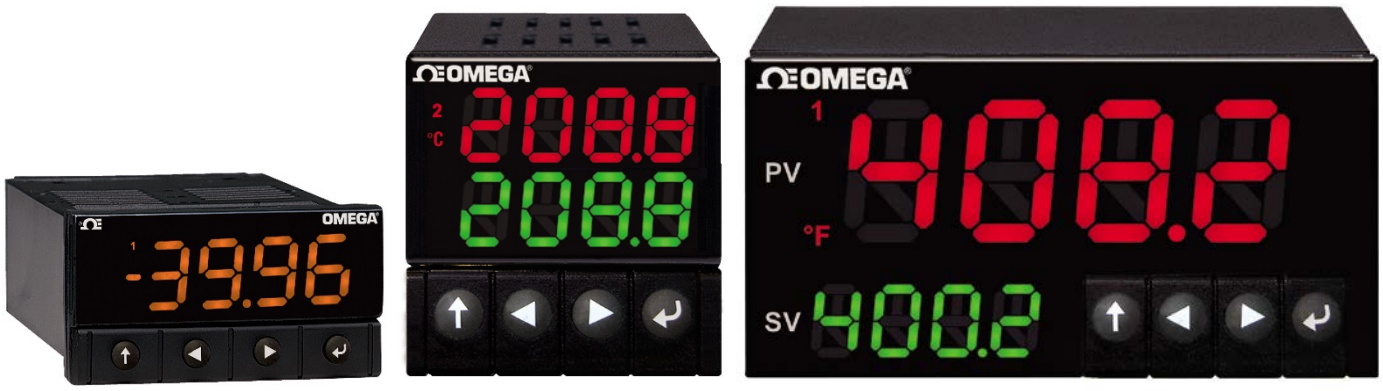
PLATINUM™ Series



CN32Pt, CN16Pt, CN16DPt, CN8Pt, CN8DPt

Temperature & Process Controllers

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MQS5451/0315

1. Introduction

The PLATINUM$_{TM}$ Series controller offers unparalleled flexibility in process measurement. While the controller is extremely powerful and versatile, great care has gone into designing a product that is easy to set up and use. Automatic hardware configuration recognition eliminates the need for jumpers and allows the unit's firmware to automatically simplify itself, eliminating all menu options that do not apply to your configuration.

Each unit allows the user to select the input type from 9 thermocouple types (J, K, T, E, R, S, B, C, and N), Pt RTDs (100, 500, or 1000 Ω, with a 385, 392, or 3916 curve), thermistors (2250 Ω, 5K Ω, and 10K Ω), DC voltage, or DC current. The analog voltage inputs are bidirectional and both voltage and current are fully scalable to virtually all engineering units with a selectable decimal point that is perfect for use with pressure, flow, or other process inputs.

Control is achieved using the PID, on/off, or heat/cool control strategy. PID control can be optimized with an autotune feature; and in addition, a fuzzy logic Adaptive Tuning Mode allows the PID algorithm to be continuously optimized. The instrument offers up to 16 Ramp and Soak segments per Ramp and Soak program (eight each), with auxiliary event actions available with each segment. Up to 99 Ramp and Soak programs can be stored, and multiple Ramp and Soak programs can be chained, creating unmatched ramp and soak programming capability. Multiple Alarms can be configured for above, below, hi/lo, and band triggering using either absolute or deviation Alarm trigger points.

The PLATINUM$_{TM}$ Series controller features a large, three-color, programmable display with the capability to change color every time the Alarm is triggered. Various configurations of mechanical relay, SSR, DC pulse, and analog voltage or current outputs are available. Every unit comes standard with USB communications for firmware updates, configuration management, and data transfer. Optional Ethernet and RS-232 / RS-485 Serial communications are also available. The Analog Output is fully scalable and may be configured as a proportional controller or retransmission to follow your display. The universal power supply accepts 90–240 Vac. The low-voltage power option accepts 24 Vac or 12–36 Vdc.

Additional features usually found only on more expensive controllers make these the most powerful products in their class. Some additional standard features are remote Setpoint for cascaded control setups, High-high/Low-low Alarm functionality, external latch reset, external Ramp and Soak program initiation, combination Heat/Cool Control Mode, configuration save and transfer, and configuration password protection.

2. Safety Considerations

This device is marked with the international caution symbol. It is important to read this manual before installing or commissioning this device as it contains important information relating to Safety and EMC (Electromagnetic Compatibility).

This instrument is a panel mount device protected in accordance with EN 61010-1:2010, electrical safety requirements for electrical equipment for measurement, control, and laboratory use. Installation of this instrument should be done by qualified personnel.

⚠ **In order to ensure safe operation, the following instructions must be followed and warnings observed:**

This instrument has no power-on switch. An external switch or circuit-breaker must be included in the building installation as a disconnecting device. It must be marked to indicate this function, and it must be in close proximity to the equipment within easy reach of the operator. The switch or circuit-breaker must comply with the relevant requirements of IEC 947–1 and IEC 947-3 (International Electrotechnical Commission). The switch must not be incorporated in the main supply cord.

Furthermore, to provide protection against excessive energy being drawn from the main supply in case of a fault in the equipment, an overcurrent protection device must be installed.

- Do not exceed the voltage rating on the label located on the top of the instrument housing.
- Always disconnect the power before changing the signal and power connections.
- Do not use this instrument on a work bench without its case for safety reasons.
- Do not operate this instrument in flammable or explosive atmospheres.
- Do not expose this instrument to rain or moisture.
- Unit mounting should allow for adequate ventilation to ensure that the instrument does not exceed the operating temperature rating.
- Use electrical wires with adequate size to handle mechanical strain and power requirements. Install this instrument without exposing the bare wire outside the connector to minimize electrical shock hazards.

⚠ **EMC Considerations**

- Whenever EMC is an issue, always use shielded cables.
- Never run signal and power wires in the same conduit.
- Use signal wire connections with twisted-pair cables.
- Install Ferrite Beads on signal wires close to the instrument if EMC problems persist.

⚠ **Failure to follow all instructions and warnings is at your own risk and may result in property damage, bodily injury and/or death. Omega Engineering is not responsible for any damages or loss arising or resulting from any failure to follow any and all instructions or observe any and all warnings.**

3. Wiring Instructions

3.1 Back Panel Connections

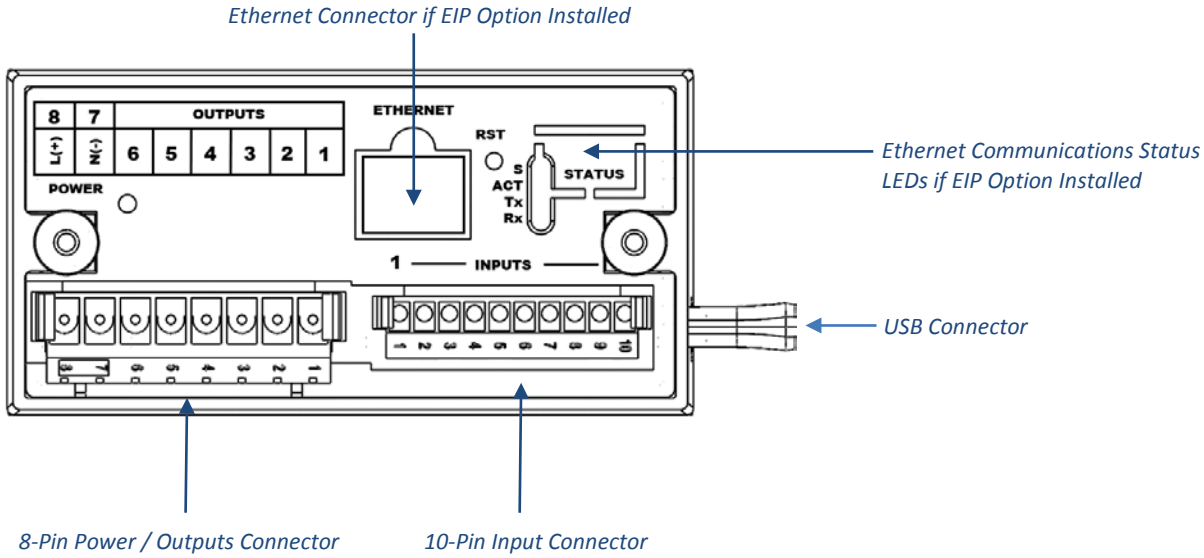


Figure 1 – CN8Pt Models: Back Panel Connections

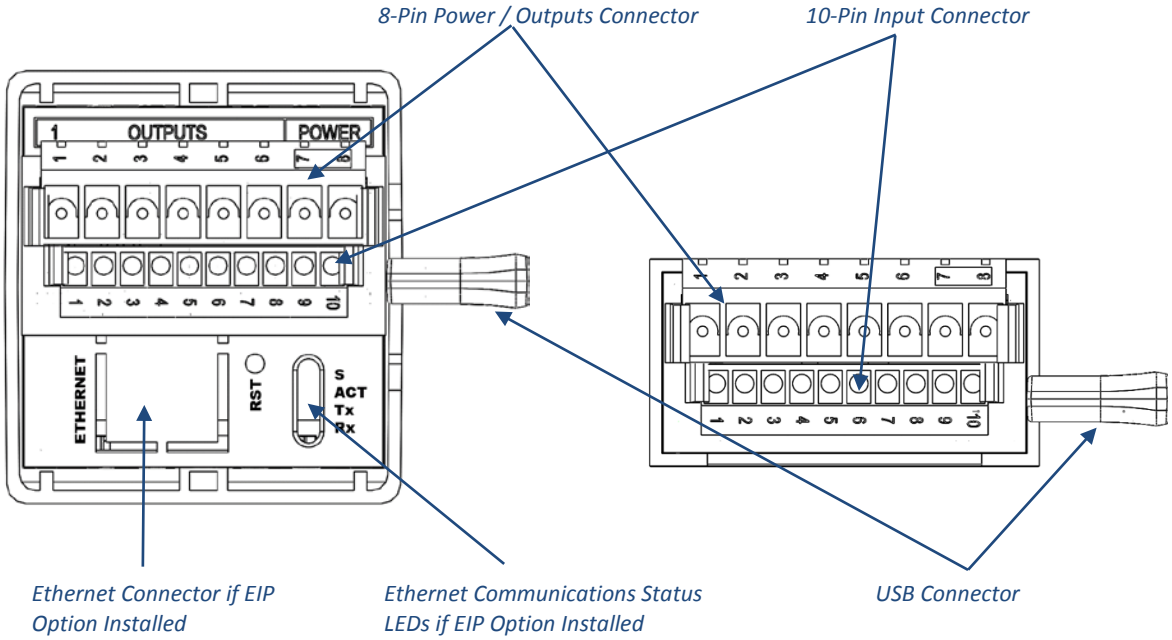
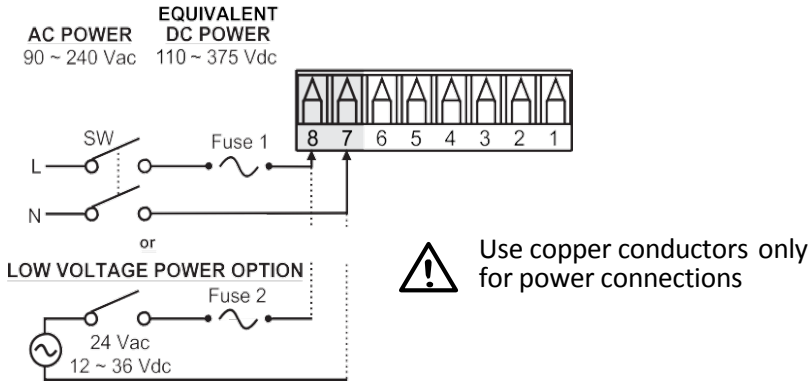


Figure 2 – CN16Pt and CN32Pt Models: Back Panel Connections

3.2 Connecting Power

Connect the main power connections to pins 7 and 8 of the 8-pin power / output connector as shown in Figure 3.



Caution: Do not connect power to your device until you have completed all input and output connections. Failure to do so may result in injury!

Figure 3 – Main Power Connections

For the low-voltage power option, maintain the same degree of protection as the standard high-voltage input power units (90–240 Vac) by using a Safety Agency Approved DC or AC source with the same Overvoltage Category and pollution degree as the standard AC unit (90–240 Vac).

The Safety European Standard EN61010-1 for measurement, control, and laboratory equipment requires that fuses must be specified based on IEC127. This standard specifies the letter code "T" for a Time-lag fuse.

3.3 Connecting Inputs

The 10-pin input connector assignments are summarized in Table 1. Table 2 summarizes the universal input pin assignments for different sensor inputs. All sensor selections are firmware-controlled and no jumper settings are required when switching from one type of sensor to another. Figure 4 provides more detail for connecting RTD sensors. Figure 5 shows the connection scheme for process current input with either internal or external excitation.

Pin No.	Code	Description
1	ARTN	Analog return signal (analog ground) for sensors and remote Setpoint
2	AIN+	Analog positive input
3	AIN-	Analog negative input
4	APWR	Analog power currently only used for 4-wire RTDs
5	AUX	Auxiliary analog input for remote Setpoint
6	EXCT	Excitation voltage output referenced to ISO GND
7	DIN	Digital input signal (latch reset, etc), Positive at > 2.5V, ref. to ISO GND
8	ISO GND	Isolated ground for serial communications, excitation, and digital input
9	RX/A	Serial communications receive
10	TX/B	Serial communications transmit

Table 1 – 10-Pin Input Connector Wiring Summary

Pin Number	Process Voltage	Process Current	Thermo-couple	2-Wire RTD	3-Wire RTD	4-Wire RTD	Ther-mistor	Remote Setpoint
1	Rtn			**	RTD2-	RTD2+		Rtn(*)
2	Vin +/-	I+	T/C+	RTD1+	RTD1+	RTD1+	TH+	
3		I-	T/C-			RTD2-	TH-	
4				RTD1-	RTD1-	RTD1-		
5								V/I In

*For Remote Setpoint with an RTD, Pin 1 on the Output Connector must be used for the RtN instead of Pin 1 on the Input Connector. Remote Setpoint is not available if you are using an RTD sensor and you have an SPDT (Type 3) Output installed.

** Requires external connection to pin 4

Table 2 – Interfacing Sensors to the Input Connector

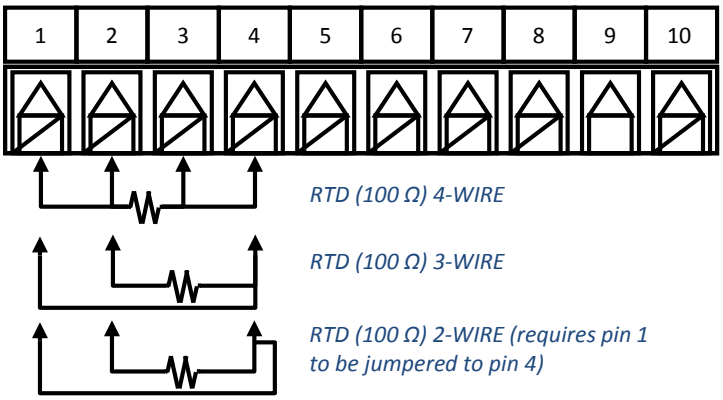


Figure 4 – RTD Wiring Diagram

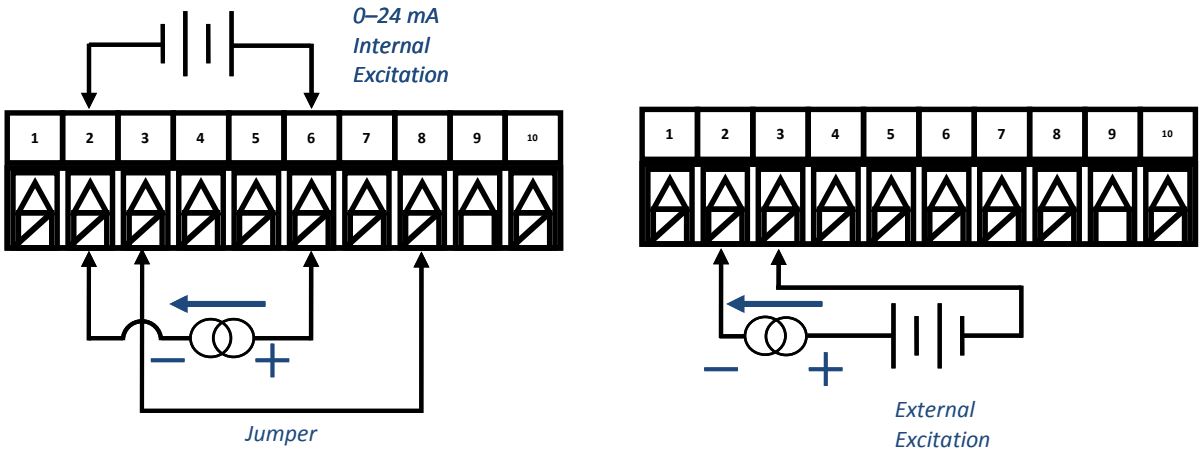


Figure 5 – Process Current Wiring Hookup with Internal and External Excitation

3.4 Connecting Outputs

The PLATINUM$_{TM}$ Series supports 5 different types of outputs with the model number numeric designations summarized in Table 3. Your unit comes preconfigured with up to 3 outputs. Table 4 shows the output connector connections for the different configurations offered. Your output configuration is the 3 numeric digits following the first dash in your model number. Table 5 defines the abbreviated codes used in Table 4. Please note that the SPST and SPDT mechanical relays have snubbers built in but only on the normally open contact side.

Code	Output Type
1	3A Mechanical single pole, single throw (SPST) mechanical relay
2	1A Solid state relay (SSR)
3	3A Mechanical single pole, double throw (SPDT) mechanical relay
4	DC pulse for connecting to an external SSR
5	Analog current or voltage

Table 3 – Output Type Designations

		Power		Output Pin Number					
Config.	**Description**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
330	SPDT, SPDT	AC+ or DC+	AC- or DC-	N.O	Com	N.C	N.O	Com	N.C
304	SPDT, DC pulse			N.O	Com	N.C		V+	Gnd
305	SPDT, analog			N.O	Com	N.C		V/C+	Gnd
144	SPST, DC pulse, DC pulse			N.O	Com	V+	Gnd	V+	Gnd
145	SPST, DC pulse, analog			N.O	Com	V+	Gnd	V/C+	Gnd
220	SSR, SSR			N.O	Com	N.O	Com		
224	SSR, SSR, DC pulse			N.O	Com	N.O	Com	V+	Gnd
225	SSR, SSR, analog			N.O	Com	N.O	Com	V/C+	Gnd
440	DC pulse, DC pulse			V+	Gnd	V+	Gnd		
444	DC pulse, DC pulse, DC pulse			V+	Gnd	V+	Gnd	V+	Gnd
445	DC pulse, DC pulse, analog			V +	Gnd	V+	Gnd	V/C+	Gnd

Table 4 – 8 Pin Output/Power Connector Wiring Summary by Configuration

Code	Definition	Code	Definition
N.O.	Normally open relay/SSR load	**AC-**	AC power neutral in pin
Com	Relay Common/SSR AC power	**AC+**	AC power hot in pin
N.C.	Normally closed relay load	**DC-**	Negative DC power in pin
Gnd	DC Ground	**DC+**	Positive DC power in pin
V+	Load for DC pulse		
V/C+	Load for analog		

Table 5 – Definitions for Abbreviations in Table 4

4. PLATINUM$_{TM}$ Series Navigation

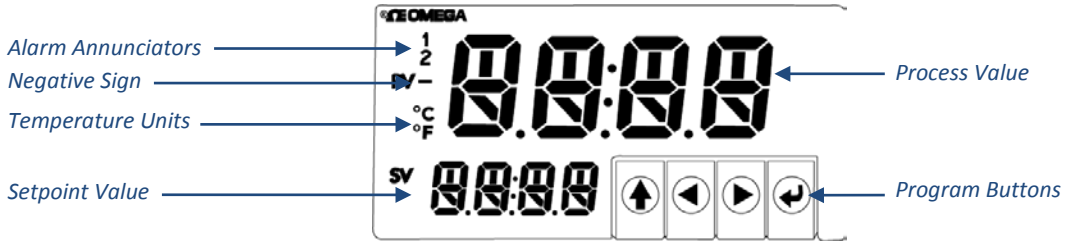


Figure 6 – PLATINUM$_{TM}$ Series Display (CN8DPt Shown)

4.1 Description of Button Actions

The UP button moves up a level in the menu structure. Pressing and holding the UP button navigates to the top level of any menu (**oPER**, **PRoG**, or **INIt**). This can be a useful way of reorienting yourself if you get lost in the menu structure.

The LEFT button moves across a set of menu choices at a given level (up in the Section 5 menu structure tables). When changing numerical settings, press the LEFT button to make the next digit (one digit to the left) active.

The RIGHT button across a set of menu choices at a given level (down in the Section 5 menu structure tables. The RIGHT button also scrolls numerical values up with overflow to 0 for the flashing digit selected.

The ENTER button selects a menu item and goes down a level, or it enters a numerical value or parameter choice.

4.2 Menu Structure

The menu structure of the PLATINUM$_{TM}$ Series is divided into 3 main Level 1 groups, which are Initialization, Programming, and Operating. They are described in Section 4.3. The complete menu structure for levels 2-8 for each of the three Level 1 groups is detailed in Section 5.1, 5.2, and 5.3. Levels 2 through 8 represent sequentially deeper levels of navigation. Values with a dark box around them are default values or submenu entry points. Blank lines indicate user-provided information. Some menu items include links to reference information elsewhere in this user manual. The information in the Notes column defines each menu choice.

4.3 Level 1 Menu

INIt Initialization Mode: These settings are rarely changed after initial setup. They include transducer types, calibration, etc. These settings can be password-protected.

PRoG Programming Mode: These settings are frequently changed. They include Setpoints, Control Modes, Alarms, etc. These settings can be password-protected.

oPER Operating Mode: This mode allows users to switch between Run Mode, Standby Mode, Manual Mode, etc.

4.4 Circular Flow of Menus

The following diagram shows how to use the LEFT and RIGHT buttons to navigate around a menu.

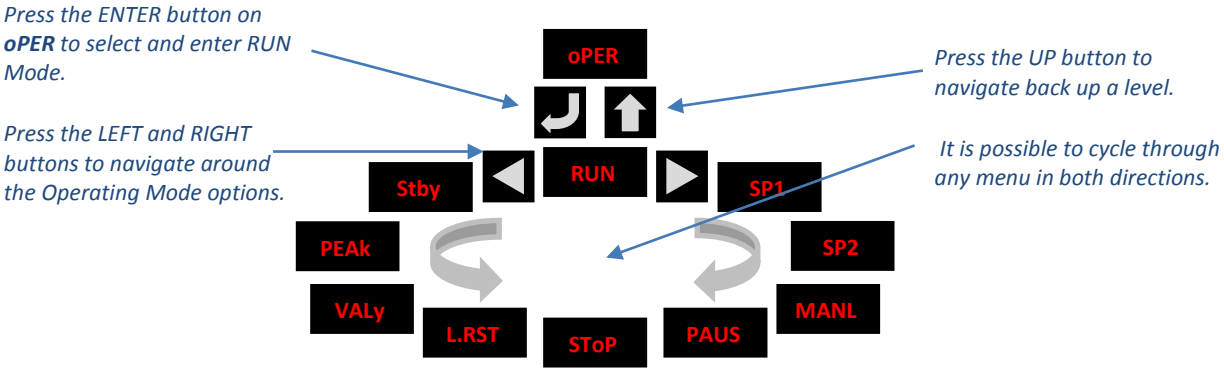


Figure 7 – Circular Flow of Menus

5. Complete Menu Structure

5.1 Initialization Mode Menu (INIt)

The following table maps the Initialization Mode (**INIt**) navigation:

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Notes
INPt	t.C.	k					Type K thermocouple
		J					Type J thermocouple
		t					Type T thermocouple
		E					Type E thermocouple
		N					Type N thermocouple
		R					Type R thermocouple
		S					Type S thermocouple
		b					Type B thermocouple
		C					Type C thermocouple
	Rtd	N.wIR	3 wI				3-wire RTD
			4 wI				4-wire RTD
			2 wI				2-wire RTD
		A.CRV	385.1				385 calibration curve, 100 Ω
			385.5				385 calibration curve, 500 Ω
			385.t				385 calibration curve, 1000 Ω
			392				392 calibration curve, 100 Ω
			3916				391.6 calibration curve, 100 Ω
	tHRM	2.25k					2250 Ω thermistor
		5k					5000 Ω thermistor
		10k					10,000 Ω thermistor

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Notes
	PRoC	4–20					Process input range: 4 to 20 mA
			Note: This Manual and Live Scaling submenu is the same for all **PRoC** ranges.				
			MANL	Rd.1	____		Low display reading
				IN.1	____		Manual input for Rd.1
				Rd.2	____		High display reading
				IN.2	____		Manual input for Rd.2
			LIVE	Rd.1	____		Low display reading
				IN.1	____		Live Rd.1 input, ENTER for current
				Rd.2	____		High display reading
				IN.2	____		Live Rd.2 input, ENTER for current
		0–24					Process input range: 0 to 24 mA
		+-10					Process input range: -10 to +10 mA
		+-1					Process input range: -1 to +1 mA
		+-0.1					Process input range: -0.1 to +0.1 mA
RdG	dEC.P	FFF.F					Reading format -999.9 to +999.9
		FFFF					Reading format -9999 to +9999
		FF.FF					Reading format -99.99 to +99.99
		F.FFF					Reading format -9.999 to +9.999
	°F°C	°F					Activates degrees Fahrenheit
		°C					Degrees Celsius annunciator
		NoNE					Default for **INPt** = **PRoC**
	FLtR	8					Readings per displayed value: 8
		16					16
		32					32
		64					64
		128					128
		1					2
		2					3
		4					4
	ANN.1	ALM.1					Alarm 1 status mapped to "1"
		ALM.2					Alarm 2 status mapped to "1"
		oUt#					Output state selections by name
	ANN.2	ALM.2					Alarm 2 status mapped to "2"
		ALM.1					Alarm 1 status mapped to "2"
		oUt#					Output state selections by name
	NCLR	GRN					Default display color: Green
		REd					Red
		AMbR					Amber

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Notes
	bRGt	HIGH					High display brightness
		MEd					Medium display brightness
		Low					Low display brightness
ECtN	5 V						Excitation voltage: 5 V
	10 V						10 V
	12 V						12 V
	24 V						24 V
	0 V						Excitation off
CoMM	USb						Configure the USB port
		Note: This **PRot** submenu is the same for USB, Ethernet, and Serial ports.					
		PRot	oMEG	ModE	CMd		Waits for commands from other end
					CoNt	____	Transmit continuously every ###.# sec
				dAt.F	StAt	No	
						yES	Includes Alarm status bytes
					RdNG	yES	Includes process reading
						No	
					PEAk	No	
						yES	Includes highest process reading
					VALy	No	
						yES	Includes lowest process reading
					UNIt	No	
						yES	Send unit with value (F, C, V, mV, mA)
				_LF_	No		
					yES		Appends line feed after each send
				ECHo	yES		Retransmits received commands
					No		
				SEPR	_CR_		Carriage Return separator in **CoNt**
					SPCE		Space separator in **CoNt** Mode
			M.bUS	RtU			Standard Modbus protocol
				ASCI			Omega ASCII protocol
		AddR	____				USB requires Address
	EtHN	PRot					Ethernet port configuration
		AddR	____				Ethernet "Telnet" requires Address
	SER	PRot					Serial port configuration
		C.PAR	bUS.F	232C			Single device Serial Comm Mode
				485			Multiple devices Serial Comm Mode
			bAUd	19.2			Baud rate: 19,200 Bd
				9600			9,600 Bd

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Notes
				4800			4,800 Bd
				2400			2,400 Bd
				1200			1,200 Bd
				57.6			57,600 Bd
				115.2			115,200 Bd
			PRty	odd			Odd parity check used
				EVEN			Even parity check used
				NoNE			No parity bit is used
				oFF			Parity bit is fixed as a zero
			dAtA	8bIt			8 bit data format
				7bIt			7 bit data format
			StoP	1bIt			1 stop bit
				2bIt			2 stop bits gives a "force 1" parity bit
		AddR	____				Address for 485, placeholder for 232
SFty	PwoN	dSbL					Turn on: in **oPER** Mode, ENTER to run
		ENbL					Turn on: program runs automatically
	RUN.M	dSbL					ENTER in **Stby, PAUS, StoP** runs
		ENbL					ENTER in modes above displays RUN
	SP.LM	SP.Lo	____				Low Setpoint limit
		SP.HI	____				High Setpoint limit
	LPbk	dSbL					Loop break timeout disabled
		ENbL	____				Loop break timeout value (MM.SS)
	o.CRk	ENbl					Open Input circuit detection enabled
		dSbL					Open Input circuit detection disabled
t.CAL	NoNE						Manual temperature calibration
	1.PNt						Set offset, default = 0
	2.PNt	R.Lo					Set range low point, default = 0
		R.HI					Set range high point, default = 999.9
	ICE.P	ok?					Reset 32°F/0°C reference value
SAVE	____						Download current settings to USB
LoAd	____						Upload settings from USB stick
VER.N	1.00.0						Displays firmware revision number
VER.U	ok?						ENTER downloads firmware update
F.dFt	ok?						ENTER resets to factory defaults
I.Pwd	No						No required password for **INIt** Mode
	yES	____					Set password for **INIt** Mode
P.Pwd	No						No password for **PRoG** Mode
	yES	____					Set password for **PRoG** Mode

5.2 Programming Mode Menu (PRoG)

The following table maps the Programming Mode (**PRoG**) navigation:

Level 2	Level 3	Level 4	Level 5	Level 6	Notes
SP1	____				Process goal for PID, default goal for **oN.oF**
SP2	ASbo				Setpoint 2 value can track **SP1**, **SP2** is an absolute value
	dEVI				**SP2** is a deviation value
ALM.1	***Note:*** This submenu is the same for all other Alarm configurations.				
	tyPE	oFF			ALM.1 is not used for display or outputs
		AboV			Alarm: process value above Alarm trigger
		bELo			Alarm: process value below Alarm trigger
		HI.Lo.			Alarm: process value outside Alarm triggers
		bANd			Alarm: process value between Alarm triggers
	Ab.dV	AbSo			Absolute Mode; use **ALR.H** and **ALR.L** as triggers
		d.SP1			Deviation Mode; triggers are deviations from **SP1**
		d.SP2			Deviation Mode; triggers are deviations from **SP2**
	ALR.H	____			Alarm high parameter for trigger calculations
	ALR.L	____			Alarm low parameter for trigger calculations
	A.CLR	REd			Red display when Alarm is active
		AMbR			Amber display when Alarm is active
		GRN			Green display when Alarm is active
		dEFt			Color does not change for Alarm
	HI.HI	oFF			High High / Low Low Alarm Mode turned off
		oN	____		Offset value for active High High / Low Low Mode
	LtCH	No			Alarm does not latch
		yES			Alarm latches until cleared via front panel
		botH			Alarm latches, cleared via front panel or digital input
		RMt			Alarm latches until cleared via digital input
	CtCL	N.o.			Output activated with Alarm
		N.C.			Output deactivated with Alarm
	A.P.oN	yES			Alarm active at power on
		No			Alarm inactive at power on
	dE.oN	____			Delay turning off Alarm (sec), default = 1.0
	dE.oF	____			Delay turning off Alarm (sec), default = 0.0
ALM.2					Alarm 2
oUt1					**oUt1** is replaced by output type
	Note: This submenu is the same for all other outputs.				
	ModE	oFF			Output does nothing
		PId			PID Control Mode

Level 2	Level 3	Level 4	Level 5	Level 6	Notes
		oN.oF	ACtN	RVRS	Off when > **SP1**, on when < **SP1**
				dRCt	Off when < **SP1**, on when > **SP1**
			dEAd	____	Deadband value, default = 5
			S.PNt	SP1	Either Setpoint can be used of on/off, default is **SP1**
				SP2	Specifying SP2 allows two outputs to be set for heat/cool
		ALM.1			Output is an Alarm using **ALM.1** configuration
		ALM.2			Output is an Alarm using **ALM.2** configuration
		RtRN	Rd1	____	Process value for **oUt1**
			oUt1	____	Output value for **Rd1**
			Rd2	____	Process value for **oUt2**
			oUt2	____	Output value for **Rd2**
		RE.oN			Activate during Ramp events
		SE.oN			Activate during Soak events
	CyCL	____			PWM pulse width in seconds
	RNGE	0–10			Analog Output Range: 0–10 Volts
		0–5			0–5 Volts
		0–20			0–20 mA
		4–20			4–20 mA
		0–24			0–24 mA
oUt2					**oUt2** is replaced by output type
oUt3					**oUt3** is replaced by output type
PId.S	ACtN	RVRS			Increase to **SP1** (i.e., heating)
		dRCt			Decrease to **SP1** (i.e., cooling)
	A.to	____			Set timeout time for autotune
	AUto	StRt			Initiates autotune after StRt confirmation
	GAIN	_P_	____		Manual Proportional Band setting
		_I_	____		Manual Integral Factor setting
		_d_	____		Manual Derivative Factor setting
	%Lo	____			Low clamping limit for Pulse, Analog Outputs
	%HI	____			High clamping limit for Pulse, Analog Outputs
	AdPt	ENbL			Enable fuzzy logic adaptive tuning
		dSbL			Disable fuzzy logic adaptive tuning
RM.SP	oFF				Use **SP1**, not remote Setpoint
	oN	4–20			Remote analog Input sets **SP1**; range: 4–20 mA
			Note: This submenu is the same for all **RM.SP** ranges.		
			RS.Lo	____	Min Setpoint for scaled range
			IN.Lo	____	Input value for **RS.Lo**
			RS.HI	____	Max Setpoint for scaled range

Level 2	Level 3	Level 4	Level 5	Level 6	Notes
			IN.HI	____	Input value for **RS.HI**
		0–24			0–24 mA
		0–10			0–10 V
		0–1			0–1 V
M.RMP	R.CtL	No			Multi-Ramp/Soak Mode off
		yES			Multi-Ramp/Soak Mode on
		RMt			**M.RMP** on, start with digital input
	S.PRG	____			Select program (number for **M.RMP** program), options 0–99
	M.tRk	RAMP			Guaranteed Ramp: soak pnt must be reached in ramp time
		SoAk			Guaranteed Soak: soak time always preserved
		CYCL			Guaranteed Cycle: ramp can extend but cycle time can't
	tIM.F	MM:SS			Minutes : Seconds time format for R/S programs
		HH:MM			Hours : Minutes time format for R/S programs
	E.ACt	StOP			Stop running at the end of the program
		HOLd			Continue to hold at the last soak setpoint at program end
		LINk	____		Start the specified ramp & soak program at program end
	N.SEG	____			1 to 8 Ramp/Soak segments (8 each, 16 total)
	S.SEG	____			Select segment number to edit, entry replaces # below
			MRt.#	____	Time for Ramp number, default = 10 min
			MRE.#	oFF	Ramp events on for this segment
				oN	Ramp events off for this segment
			MSP.#	____	Setpoint value for Soak number
			MSt.#	____	Time for Soak number, default = 10 min
			MSE.#	oFF	Soak events off for this segment
				oN	Soak events on for this segment

5.3 Operating Mode Menu (oPER)

The following table maps the Operating Mode (**oPER**) navigation:

Level 2	Level 3	Level 4	Notes
RUN			Normal Run Mode, process value displayed, **SP1** in optional secondary display
SP1	____		Shortcut to change Setpoint 1, current Setpoint 1 value in main display
SP2	____		Shortcut to change Setpoint 2, current Setpoint 2 value in main display
MANL	M.CNt	____	Manual Mode, the RIGHT and LEFT buttons control output, displays **M##.#**
	M.INP	____	Manual Mode, the RIGHT and LEFT buttons simulate the input for testing
PAUS			Pause and hold at current process value, display flashes
StoP			Stop controlling, turn off outputs, process value rotating flash, Alarms remain
L.RSt			Clears any latched Alarms; Alarms menu also allows digital input reset
VALy			Displays the lowest input reading since the **VALy** was last cleared
PEAk			Displays the highest input reading since the **PEAk** was last cleared
Stby			Standby Mode, outputs, and Alarm conditions disabled, displays **Stby**

Note: For Warranty information see the complete product manual at:

www.omega.com/manuals/manualpdf/M5451.pdf